In The Claims

Claims 1-73 (canceled).

74. (original) A method for removing NOx and SOx contaminants from a gaseous stream comprising the steps of:

(A) in a sorbing period, passing a lean gaseous stream within a sorbing temperature range through a layered catalyst composite comprising a first layer and a second layer:

(a) the first layer comprising a first support and a first platinum component; and

(b) the second layer comprising a second support and a SOx sorbent component having a free energy of formation from about 0 to about -90 Kcal/mole at 350°C.;
to sorb at least some of the SOx contaminants into the second layer and thereby provide a SOx depleted gaseous stream exiting the second layer and entering the first layer, wherein the first layer sorbs and abates the NOx in the gaseous stream; and

(B) in a desorbing period, converting the lean oxidative stream to a rich reductive gaseous stream and raising the temperature of the gaseous stream to within a desorbing temperature range to thereby reduce and desorb at least some of the SOx contaminants from the second layer and thereby provide a SOx enriched gaseous stream exiting the second layer.

75. (original) The method as recited in claim 74, wherein the first and second supports are the same or different and are compounds selected from the group consisting of silica, alumina, and titania compounds.

Claims 76 and 77 (canceled).

78. (original) The method as recited in claim 74, wherein the SOx sorbent component has a free energy of formation from about 0 to about -60 Kcal/mole at 350°C.

79. (original) The method as recited in claim 78, wherein the SOx sorbent component has a free energy of formation from about -30 to about -55 Kcal/mole at 350°C.

80. (original) The method as recited in claim 74, wherein the SOx sorbent component is selected from the group consisting of oxides and aluminum oxides of lithium, magnesium, calcium, manganese, iron, cobalt, nickel, copper, zinc, and silver.

81. (original) The method as recited in claim 80, wherein the SOx sorbent component is selected from the group consisting of MgO, MgAl2O4, MnO, MnO2, and Li2O.

82. (original) The method as recited in claim 81, wherein the SOx sorbent component is MgO or Li2O.

Claims 83-92 (canceled).

93. (original) The method as recited in claim 74, wherein the second layer comprises from about 0.03g/in3 to about 2.4g/in3 of the SOx sorbent component.

94. (original) The method as recited in claim 93, wherein the second layer comprises from about 0.3g/in3 to about 1.8g/in3 of the SOx sorbent component.

95. (original) The method as recited in claim 74, wherein the first layer further comprises a NOx sorbent component selected from the group consisting of alkaline earth metal components, alkali metal components, and rare earth metal components.

96. (original) The method as recited in claim 95, wherein the NOx sorbent component is selected from the group consisting of oxides of calcium, strontium, and barium, oxides of potassium, sodium, lithium, and cesium, and oxides of cerium, lanthanum, praseodymium, and neodymium.

97. (original) The method as recited in claim 96, wherein the NOx sorbent component is selected from the group consisting of oxides of calcium, strontium, and barium.

98. (original) The method as recited in claim 96, wherein the NOx sorbent component is selected from the group consisting of oxides of potassium, sodium, lithium, and cesium.

99. (original) The method as recited in claim 96, wherein the NOx sorbent component is selected from the group consisting of oxides of cerium, lanthanum, praseodymium, and neodymium.

100. (original) The method as recited in claim 96, wherein the NOx sorbent component is at least one alkaline earth metal component and at least one rare earth metal component selected from the group consisting of lanthanum and neodymium.

101. (original) The method as recited in claim 74, wherein at least one of the first or second layers further comprises a zirconium component.

102. (original) A method for removing NOx and SOx contaminants from a gaseous stream comprising the steps of:

(A) in a sorbing period, passing a lean gaseous stream within a sorbing temperature range through an axial layered catalyst composite comprising an upstream section and a downstream section:

(1) the downstream section comprising:

(a) a downstream substrate; and

(b) a first layer on the downstream substrate, the first layer comprising a first support and a first platinum component;

(2) the upstream section comprising:

(a) an upstream substrate; and

(b) a second layer on the upstream substrate, the second layer comprising a second support and a SOx sorbent component having a free energy of formation from about 0 to about -90 Kcal/mole at 350°C.;

to sorb at least some of the SOx contaminants into the upstream section and thereby provide a SOx depleted gaseous stream exiting the upstream section and entering the downstream section, wherein the downstream section sorbs and abates the NOx in the gaseous stream; and

(B) in a desorbing period, converting the lean oxidative gaseous stream to a rich reductive gaseous stream and raising the temperature of the gaseous stream to within a desorbing temperature range to thereby reduce and desorb at least some of the SOx contaminants from the upstream section and thereby provide a SOx enriched gaseous stream exiting the upstream section.

103. (original) The method as recited in claim 102, wherein

(1) the first layer on the downstream substrate further comprises a NOx sorbent component selected from the group consisting of cesium components, potassium components, and cerium components; and

(2) the second layer on the upstream substrate comprises a SOx sorbent component which is $MgAl_2O_4$; and

further comprising a first midstream section located between the upstream section and the downstream section:

(3) the first midstream section comprising:

(a) a first midstream substrate; and

(b) a third layer on the first midstream substrate, the third layer comprising:

(i) a third support; and

(ii) a third SOx sorbent component which is selected from the group consisting of BaO and MgO;

to sorb at least some of the SOx contaminants into the first midstream section and thereby provide a SOx depleted gaseous stream exiting the first midstream section and entering the downstream section, wherein the downstream section sorbs and abates the NOx in the gaseous stream; and

(B) in a desorbing period, converting the lean gaseous stream to a rich gaseous stream and raising the temperature of the gaseous stream to within a desorbing temperature range to thereby reduce and desorb at least some of the SOx contaminants from the first midstream section and thereby provide a SOx enriched gaseous stream exiting the first midstream section.

104. (original) A method for removing NOx and SOx contaminants from a gaseous stream comprising the steps of:

(A) in a sorbing period, passing a lean gaseous stream within a sorbing temperature range through a radial layered catalyst composite comprising a bottom layer, a first middle layer, and a top layer:

(a) the bottom layer comprising:

(i) a first support;

(ii) a first platinum component;

(iii) a first NOx sorbent component selected from the group consisting of cesium components, potassium components, and cerium components; and

(b) the first middle layer comprising:

(i) a second support;

(ii) a second SOx sorbent component which is selected from the group consisting of BaO and MgO; and

(c) the top layer comprising:

(i) a third support;

(ii) a third SOx sorbent component which is MgAl2O4;

to sorb at least some of the SOx contaminants into the top and first middle layers and thereby provide a SOx depleted gaseous stream exiting the top and first middle layers and entering the bottom layer, wherein the bottom layer sorbs and abates the NOx in the gaseous stream; and

(B) in a desorbing period, converting the lean gaseous stream to a rich gaseous stream and raising the temperature of the gaseous stream to within a desorbing temperature range to thereby reduce and desorb at least some of the SOx contaminants from the top and first middle layers and thereby provide a SOx enriched gaseous stream exiting the top and first middle layers.

105. (original) The method as recited in claim 104, wherein

(3) the first middle layer comprises a SOx sorbent component which is MgO; and

further comprising a second middle layer located between the bottom layer and the first middle layer:

(d) the second middle layer comprising:

(i) a fourth support; and

(ii) a SOx sorbent component which is BaO;

to sorb at least some of the SOx contaminants into the second middle layer and thereby provide a SOx depleted gaseous stream exiting the second middle layer and entering the bottom layer, wherein the bottom layer sorbs and abates the NOx in the gaseous stream; and

(B) in a desorbing period, converting the lean gaseous stream to a rich gaseous stream and raising the temperature of the gaseous stream to within a desorbing temperature range to thereby reduce and desorb at least some of the SOx contaminants from the second middle layer and thereby provide a SOx enriched gaseous stream exiting the second layer.

Claims 106-118 (canceled).